IN THE CLAIMS

1. (Currently amended) A method of probing for a nucleic acid comprising: contacting a nucleic acid solution with an oligonucleotide probe labeled with an electrochemically active marker; providing conditions at which the oligonucleotide probe is able to at least partially hybridize with any complementary target nucleic acid sequence which may be present in the nucleic acid solution; selectively degrading [[either]] hybridized [[, partially hybridized or unhybridized]] oligonucleotide probe, the degrading resulting in degraded oligonucleotide probe; and electrochemically determining [[information relating to]] the activity of the electrochemically active marker, wherein the electrochemical activity of [[information relating to]] the electrochemically active marker exhibits different electrochemical characteristics depending on (a) whether or not it is attached to a nucleotide, (b) whether or not that nucleotide is incorporated into the oligonucleotide or not, and (c) the length of the oligonucleotide, and wherein the different electrochemical characteristics are a change to the activity of the electrochemically active marker of the degraded oligonucleotide probe compared with the activity of the electrochemically active marker of non-degraded oligonucleotide probe [[correlates with the presence of the nucleic acid]] and wherein the electrochemical activity of [[information relating to]] the electrochemically active marker correlates with the size [[and characteristics]] of the degraded [[or]] and the non-degraded oligonucleotide probe, the method resulting in probing for the nucleic acid.

2. (Previously presented) A method as claimed in claim 1 wherein the electrochemically determined information relating to the marker is used to derive information concerning the presence or absence of at least one nucleic acid species.

3. (Previously presented) A method as claimed in claim 1 wherein the electrochemical technique is used to quantify relative proportions of degraded and non-degraded oligonucleotide probe.

4. (Previously presented) A method as claimed in claim 1 wherein oligonucleotide probe that has failed to successfully hybridize is digested by an enzyme that has been chosen to selectively digest single stranded unhybridized nucleic acid.

5. (Original) A method as claimed in claim 4 wherein the enzyme is an endonuclease.

6. (Previously presented) A method as claimed in claim 4 wherein the enzyme is a ribonuclease.

7. (Previously presented) A method as claimed in claim 4 herein the enzyme is a deoxyribonuclease.

8. (Previously presented) A method as claimed in claim 4 wherein the enzyme is S1 deoxyribonuclease.

9. (Previously presented) A method as claimed in claim 4 wherein the enzyme is an exonuclease.

10. (Canceled)

11. (Previously presented) A method as claimed in claim 1 wherein oligonucleotide probe that has successfully hybridized is digested by an enzyme that has been chosen to selectively digest at least one strand of double stranded hybridized nucleic acid.

12. (Original) A method as claimed in claim 11 wherein the enzyme is a 5' nuclease.

13. (Original) A method as claimed in claim 12 wherein the 5' nuclease is also a DNA polymerase.

14. (Original) A method as claimed in claim 13 wherein the 5' nuclease/DNA polymerase is a thermostable enzyme.

15. (Original) A method as claimed in claim 14 wherein the thermostable enzyme is Taq polymerase.

16. (Previously amended) A method as claimed in claim 14 wherein the nucleic acid solution also comprises a pair of primers suitable for extension by the DNA polymerase.

17. (Original) A method as claimed in claim 16 wherein reaction conditions and temperature cycling are suitable for a polymerase chain reaction (PCR) to take place concomitant to the 5' nuclease digestion of probe.

18. (Previously presented) A method as claimed in claim 1, in which a first oligonucleotide probe labeled with an electrochemically active marker is prevented from complete hybridization by competition from a second oligonucleotide, and the resultant partially hybridized oligonucleotide labeled with an electrochemically active marker is cleaved by an enzyme that specifically recognizes the configuration of the two oligonucleotides hybridized onto the target nucleic acid, said cleavage effectively shortening the oligonucleotide portion to which the electrochemically active marker is attached.

19. (Previously presented) A method as claimed in claim 1, in which a first oligonucleotide probe is prevented from complete hybridization by competition from a second oligonucleotide, and the resultant partially hybridized first oligonucleotide probe is cleaved by an enzyme that specifically recognizes the configuration of the two oligonucleotides hybridized onto the target nucleic acid, the cleavage product being recognized by a recognition cassette which comprises at lease one oligonucleotide and is able to hybridize to the first cleavage product to produce an oligonucleotide configuration recognizable by an enzyme that cleaves a region of the recognition cassette that is labeled with an electrochemically active marker.

20. (Previously presented) A method as claimed in claim 1 wherein the electrochemically determined information is used for the detection of nucleic acid polymorphisms.

21. (Previously presented) A method as claimed in claim 1 wherein the electrochemically determined information is used for detection of allelic polymorphisms.

22. (Previously presented) A method as claimed in claim 1 wherein the electrochemically determined information is used for the detection of single nucleotide polymorphisms.

23. (Previously presented) A method as claimed in claim 1 wherein the electrochemically determined information is used for the quantification of nucleic acid species.

24. (Previously presented) A method as claimed claim 1 wherein the electrochemically determined information is used for the quantification of gene expression.

25. (Previously presented) A method as claimed in claim 16 wherein primer design and/or probe design and/or thermal cycling and detection of electrochemically active marker is carried out automatically or with the assistance of a software-directed microprocessor.

26-42. (Canceled)

43. (Previously presented) A method as claimed in claim 1 wherein the electrochemically determined information is used for the detection of a genetic disease or a genetic disease carrier status or a genetic predisposition to disease.

44. (Previously presented) A method as claimed in claim 1 wherein the electrochemically determined information is used to detect or identify a pathogen in a sample.

45. (Previously presented) A method as claimed in claim 1 wherein the electrochemically determined information is used to predict a response of an organism to a therapeutic or toxic agent.

46-90. (Canceled)

91. (Previously presented) A method as claimed in claim 1 in which two or more oligonucleotide probes are used, each probe being labeled with a different electrochemically active marker.

92. (Original) A method as claimed in claim 91 in which the two or more electrochemically active markers have peaks in their voltammogram traces that are resolvable from each other.

93. (Previously presented) A method as claimed in claim 12, wherein the enzyme is T7 exonuclease.

94. (Previously presented) A method as claimed in claim 24 wherein the unhybridized nucleic acid is degraded by an enzyme.

95. (Previously presented) A method as claimed in claim 94 wherein the enzyme is an endonuclease.

96. (Previously presented) A method as claimed in claim 94 wherein the enzyme is a ribonuclease.

97. (Previously presented) A method as claimed in claim 94 wherein the enzyme is a deoxyribonuclease.

98. (Previously presented) A method as claimed in claim 94 wherein the enzyme is S1 deoxyribonuclease.

99. (Previously presented) A method as claimed in claim 1 wherein the electrochemical step is voltammetry.

100. (Previously presented) A method as claimed in claim 1 wherein the electrochemical step is an amperometric technique.

101. (Previously presented) A method as claimed in claim 1 wherein the electrochemical step is differential pulse voltammetry.

102. (Previously presented) A method as claimed in claim 1 wherein the electrochemical technique utilizes one or more electrodes that have been functionally surrounded by a selectively permeable membrane.

103. (Previously presented) A method as claimed in claim 102 wherein the membrane is selectively permeable on the basis of molecular size.

104. (Previously presented) A method as claimed in claim 102 wherein the membrane is selectively permeable on the basis of charge.

105. (Previously presented) A method as claimed in claim 102 wherein the membrane is selectively permeable on the basis of hydrophobicity or hydrophilicity.

106-108. (Canceled)

109. (Currently amended) A method of probing for a nucleic acid comprising: contacting a nucleic acid solution with an oligonucleotide probe labeled with an electrochemically active marker; providing conditions at which the oligonucleotide probe is able to at least partially hybridize with any complementary target nucleic acid sequence which may be

present in the nucleic acid solution; selectively digesting hybridized oligonucleotide probe using a duplex specific exonuclease; and electrochemically determining [[information relating to]] the activity of the electrochemically active marker, wherein the [[electrochemically determined information relating to]] electrochemical activity of the electrochemically active marker exhibits different electrochemical characteristics depending on (a) whether or not it is attached to a nucleotide, (b) whether or not that nucleotide is incorporated into the oligonucleotide or not, and (c) the length of the oligonucleotide, and wherein the different electrochemical characteristics are a change to the activity of the electrochemically active marker of the degraded oligonucleotide probe compared with the activity of the electrochemically active marker of non-degraded oligonucleotide probe [[correlates with the presence of the nucleic acid]] and wherein the electrochemical activity of [[electrochemically determined information relating to]] the electrochemically active marker correlates with the extent of digestion of the oligonucleotide probe, the method resulting in probing for the nucleic acid.

110. (Previously presented) A method as claimed in claim 109 wherein the exonuclease is selected from the group consisting of a duplex specific exonuclease, a 5'-3' exonuclease, a 3'-5' exonuclease, and T7 nuclease.

111. (Previously presented) A method as claimed in claim 109 wherein the exonuclease is a 5'-3' exonuclease.

112. (Previously presented) A method as claimed in claim 109 wherein the electrochemically determined information relating to the marker is used to derive information concerning the presence or absence of at least one nucleic acid species.

113. (Previously presented) A method as claimed in claim 109 wherein the electrochemical technique is used to quantify relative proportions of degraded and non-degraded oligonucleotide probe, if present.

114. (Previously presented) A method as claimed in claim 111 wherein the 5'-3' nuclease is also a DNA polymerase.

115. (Previously presented) A method as claimed in claim 114 wherein the nucleic acid solution also comprises a pair of primers suitable for extension by the DNA polymerase.

116. (Previously presented) A method as claimed in claim 115 wherein reaction conditions and temperature cycling are suitable for a polymerase chain reaction (PCR) to take place concomitant to the 5' nuclease digestion of probe.

117. (Previously presented) A method as claimed in claim 109, in which a first oligonucleotide probe labeled with an electrochemically active marker is prevented from complete hybridization by competition from a second oligonucleotide, and the resultant partially hybridized oligonucleotide labeled with an electrochemically active marker is cleaved by an enzyme that specifically recognizes the configuration of the two oligonucleotides hybridized onto the target nucleic acid, said cleavage effectively shortening the oligonucleotide portion to which the electrochemically active marker is attached.

118. (Previously presented) A method as claimed in claim 109, in which a first oligonucleotide probe is prevented from complete hybridization by competition from a second oligonucleotide, and the resultant partially hybridized first oligonucleotide probe is cleaved by an enzyme that specifically recognizes the configuration of the two oligonucleotides hybridized onto the target nucleic acid, the cleavage product being recognized by a recognition cassette which comprises at lease one oligonucleotide and is able to hybridize to the first cleavage product to produce an oligonucleotide configuration recognizable by an enzyme that cleaves a region of the recognition cassette that is labeled with an electrochemically active marker.

119. (Previously presented) A method as claimed in claim 109 wherein the electrochemically determined information is used for the detection of nucleic acid polymorphisms.

120. (Previously presented) A method as claimed in claim 109 wherein the electrochemically determined information is used for detection of allelic polymorphisms.

121. (Previously presented) A method as claimed in claim 109 wherein the electrochemically determined information is used for the detection of single nucleotide polymorphisms.

122. (Previously presented) A method as claimed in claim 109 wherein the electrochemically determined information is used for the quantification of nucleic acid species.

123. (Previously presented) A method as claimed claim 109 wherein the electrochemically determined information is used for the quantification of gene expression.

124. (Previously presented) A method as claimed in claim 115 wherein primer design and/or probe design and/or thermal cycling and detection of electrochemically active marker is carried out automatically or with the assistance of a software-directed microprocessor.

125. (Previously presented) A method as claimed in claim 109 in which two or more oligonucleotide probes are used, each probe being labeled with a different electrochemically active marker.

126. (Previously presented) A method as claimed in claim 125 in which the two or more electrochemically active markers have peaks in their voltammogram traces that are resolvable from each other.

127. (Previously presented) A method as claimed in claim 109 wherein the electrochemical step is voltammetry.

128. (Previously presented) A method as claimed in claim 109 wherein the electrochemical step is an amperometric technique.

129. (Previously presented) A method as claimed in claim 109 wherein the electrochemical step is differential pulse voltammetry.

130. (Previously presented) A method as claimed in claim 109 wherein the electrochemical technique utilizes one or more electrodes that have been functionally surrounded by a selectively permeable membrane.

131. (Previously presented) A method as claimed in claim 130 wherein the membrane is selectively permeable on the basis of molecular size.

132. (Previously presented) A method as claimed in claim 130 wherein the membrane is selectively permeable on the basis of charge.

133. (Previously presented) A method as claimed in claim 130 wherein the membrane is selectively permeable on the basis of hydrophobicity or hydrophilicity.